

K. C. WIDEEN.
CURVED REFLECTOR.
(Application filed Aug. 17, 1900.)

(No Model.)

FIG. 1.

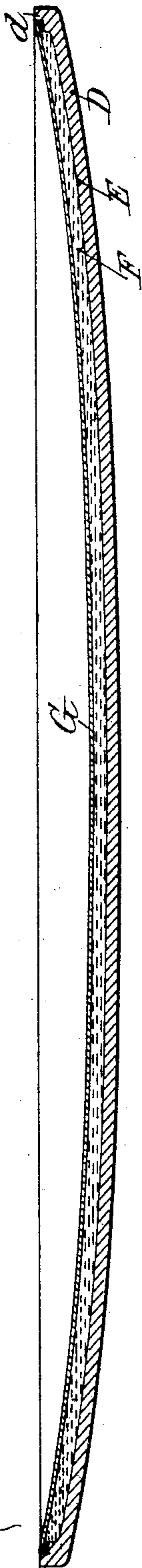


FIG. 3.

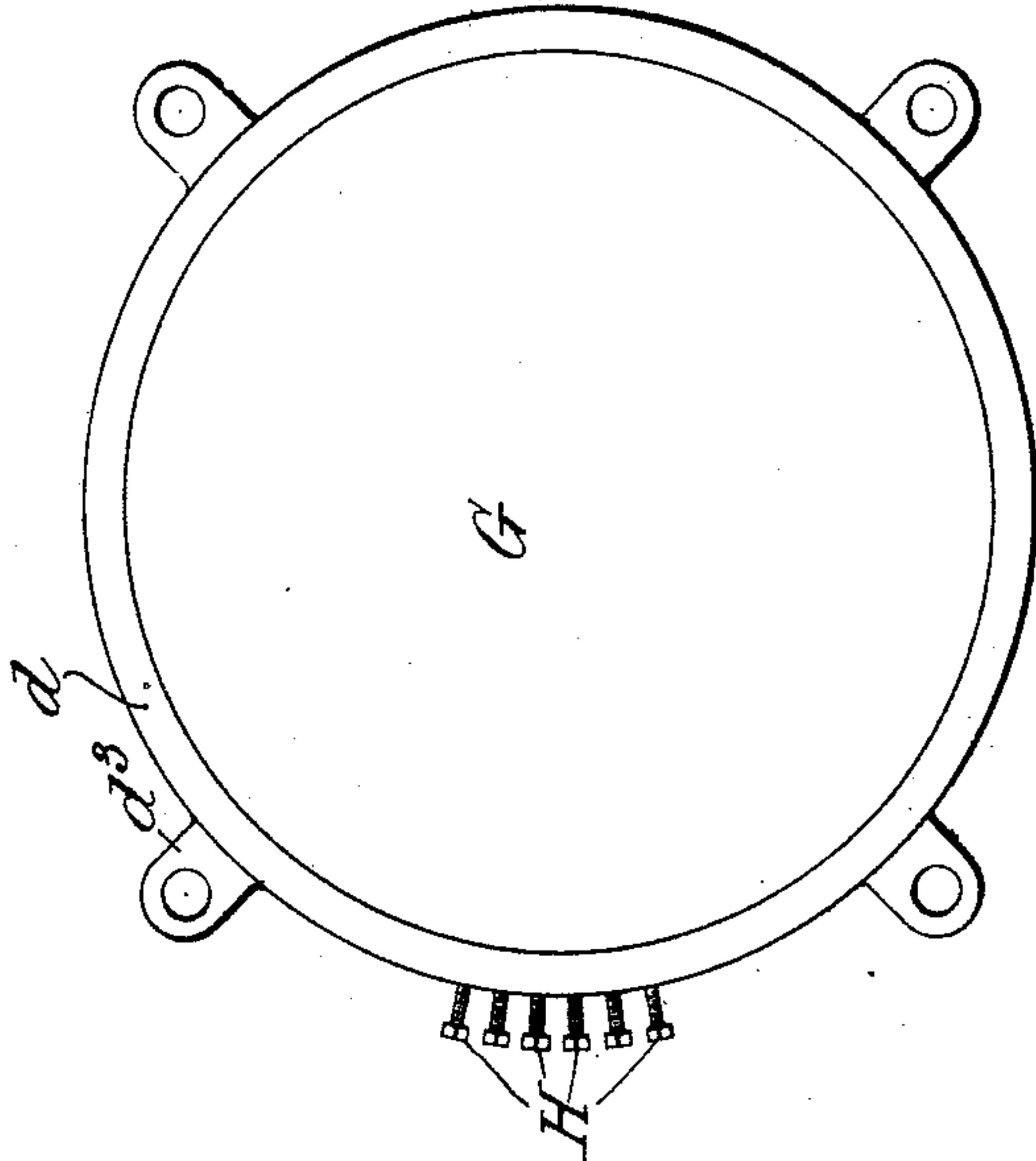


FIG. 2.

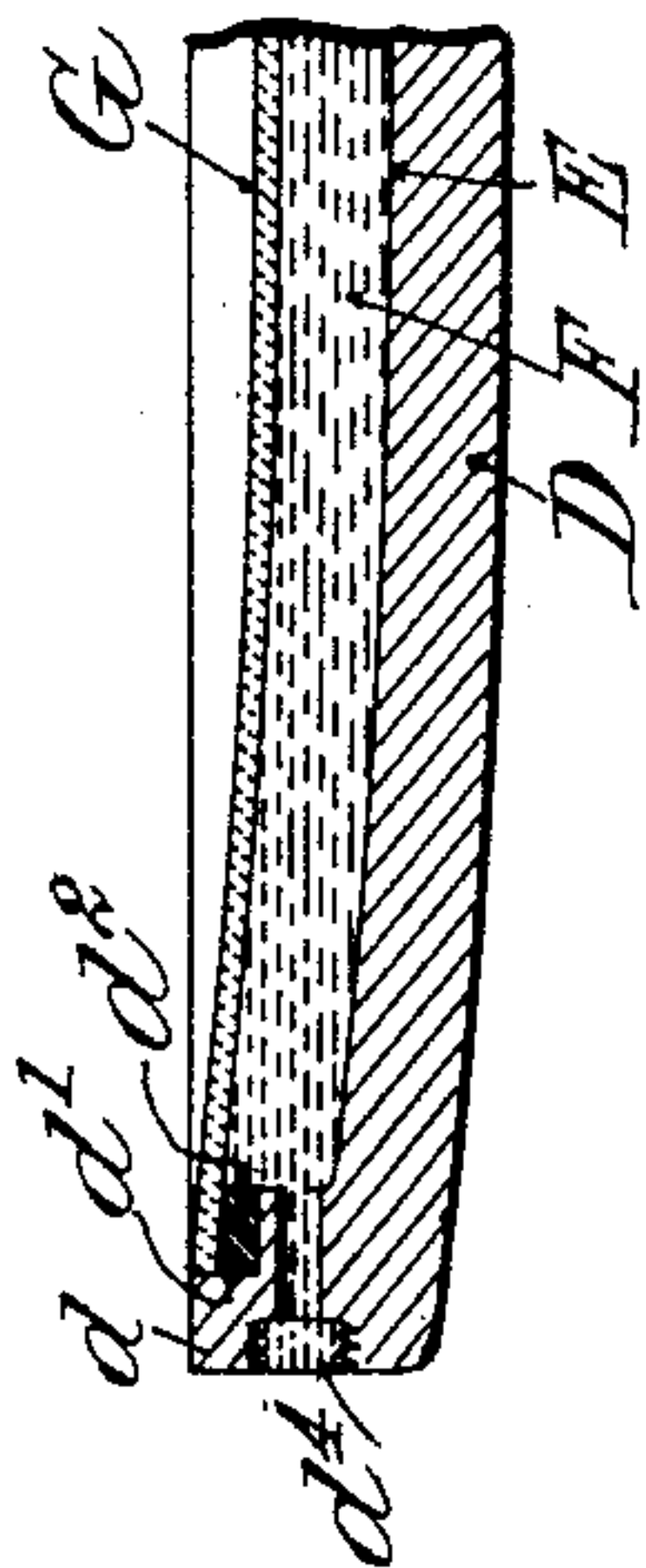
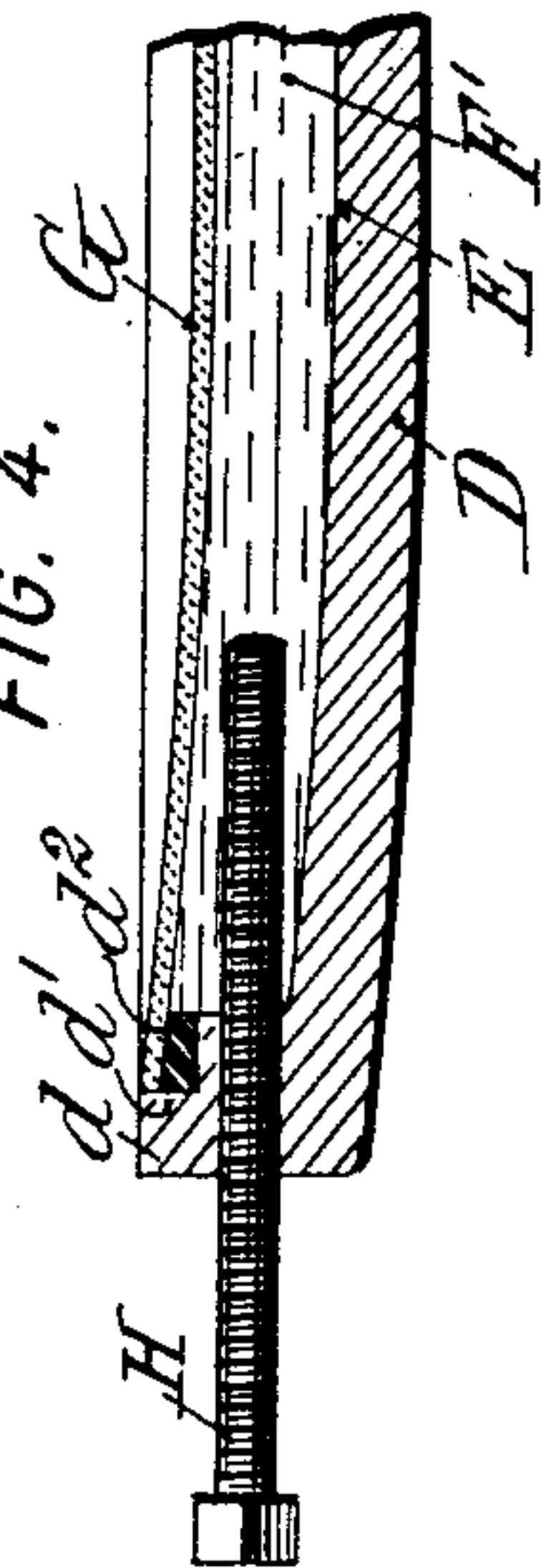


FIG. 4.



WITNESSES:
Dominic A. Usina
Thomas J. Wallace

INVENTOR:
Knut C. Wideen,
By Attorneys,
Arthur F. Fraser & Co

UNITED STATES PATENT OFFICE.

KNUT C. WIDEEN, OF NEW YORK, N. Y.

CURVED REFLECTOR.

SPECIFICATION forming part of Letters Patent No. 683,164, dated September 24, 1901.

Original application filed April 27, 1900, Serial No. 14,638. Divided and this application filed August 17, 1900. Serial No. 27,143. (No model.)

To all whom it may concern:

Be it known that I, KNUT C. WIDEEN, a subject of the King of Sweden and Norway, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Curved Reflectors, of which the following is a specification.

My invention provides a curved mirror or reflector of great strength, rigidity, and regularity of curvature.

My invention provides also a curved reflector which is especially suitable for use in the system for collecting and utilizing solar heat described in my application for Letters Patent, Serial No. 14,638, filed April 27, 1900, of which the present application is a division.

It provides also various other improvements, all of which are set forth in detail in the following specification.

In the accompanying drawings, illustrating practical embodiments of my invention, Figure 1 is a diametrical section of one of my curved reflectors. Fig. 2 is a portion of a similar section on an enlarged scale. Fig. 3 is a plan of one of my improved reflectors, including the mirror or reflector proper and the frame. Fig. 4 is a view similar to Fig. 2, showing a modified form.

The principal elements of my reflector are a curved mirror or reflector proper and a backing fitting such mirror closely, so as to maintain the desired curvature and to protect the silvering where silvered glass is used. Said backing is also preferably retained in place by a frame, which forms a closed chamber at the back of the mirror. The backing is preferably of hard stiff material and is best fitted to the curvature of the mirror closely by being molded thereon at a pressure different from that of the atmosphere, as hereinafter explained.

Referring to Figs. 1, 2, and 3 of the drawings, D is a casting or frame having a body portion circular in outline and depressed at the center, so as to form approximately a segment of a sphere, and having a rim d projecting upward all around such center portion, forming a chamber E. The inner edge of the rim d is rabbeted, as shown at d' , and carries an annular washer d^2 , of yielding material. On the outside of the rim are formed

a series of perforated lugs d^3 , used in attaching the mirror to its supports or in handling the castings in the process of manufacturing the mirror.

G is the plate, of reflecting material—such as silvered glass, celluloid, or polished metal—which forms the reflector proper.

At two points of the casting D, shown diametrically opposite, are perforations d^4 , used in introducing the backing material F in place, as explained in my application for patent on process for making curved mirrors filed June 12, 1900. In brief, such process consists in setting a plane mirror on the packing d^2 , exhausting the air from the chamber E by means of a suction-pump connected with one of the perforations d^4 and simultaneously supplying its place with a liquid through another of the perforations d^4 , preferably liquid stearin, rosin, lead, or the like F. If a concave mirror is desired, a portion of the liquid is then withdrawn by means of the same suction-pump or in any other suitable way, no air being admitted to take its place. The atmospheric pressure, therefore, presses the reflector inward in a true spherical curve and in continuous close contact with the backing material until it has attained the desired curvature. The backing material is then hardened, as by gradual cooling. For producing a convex mirror the air is exhausted and its place supplied by the liquid backing, as above, and then the latter is increased in volume till the reflector has assumed the desired outward convexity, when the backing may be hardened. In either case it is the difference of pressure which produces the curvature.

It is obvious that a great variety of materials may be used instead of the stearin, rosin, or lead referred to, the principal desideratum being that it shall enter the chamber E in liquid form and shall subsequently become quite hard, so as to give a firm backing to the mirror and stiffen the whole as much as possible. Stearin is especially useful because of its slight expansion under heat and also its slight contraction in solidifying and because it melts at a comparatively low temperature—77° centigrade—and is about as hard as wood when cold.

By reason of the exclusion of air from between the mirror and its backing and the cementitious nature of the backing the mirror is held rigidly to the curvature assumed
 5 under the fluid-pressure. By the utilization of the fluid property of the air and the elastic resistance of the glass a perfectly spherical curvature is insured.

Though I have described with great particularity of detail one embodiment of my invention, yet it will be apparent that many modifications of the same, both in the general arrangement and in the individual features thereof, are possible to those skilled in this
 15 art without sacrificing all the advantages of my invention and without departing from the spirit thereof. For example, by a slight modification of the frame I obtain a reflector which after it has been finished is capable of very
 20 nice adjustment in curvature. Fig. 4 shows such a modification. The frame D, chamber E, and mirror G are the same as in Fig. 2. At one side the casing is pierced by one or more plungers, such as bolts H, screwed
 25 through the rim d , which are capable of movement into and out of the chamber to increase or decrease the volume of its contents and correspondingly alter the degree of curvature of the mirror. Fig. 3 shows six of such plungers placed adjacent to each other for convenience. In this modification the holes d^4
 30 will be sealed after the backing has been admitted and the curvature brought approximately to that desired by liquefying or softening the contents and moving the plungers inward or outward. The plungers may also be moved inward or outward while the backing is still in its original liquid state, so as to secure a greater niceness of adjustment than
 35 is possible with the pumps used in introducing the backing material.

What I claim, therefore, and desire to secure by Letters Patent, is a curved mirror having the following-defined novel features, each
 45 substantially as described:

1. In a reflector, the combination of a curved mirror, a frame forming with said mirror a closed chamber at the back of said mirror, and a backing filling said chamber and fitting
 50 said mirror closely, said backing being solid at ordinary temperatures.

2. In a reflector, the combination of a curved mirror, a frame forming with said mirror a closed chamber at the back of said mirror, and a backing of stearin filling said chamber
 55 and fitting said mirror closely.

3. In a reflector, the combination of a curved mirror, a frame forming a chamber at the back of said mirror, and a solid backing filling said chamber, said chamber being closed
 60 by said mirror whereby a difference of pressure may be maintained between said backing and the atmosphere to maintain the curvature of said mirror.

4. In a reflector, the combination of a curved mirror, a frame forming a chamber at the back of said mirror, and a backing of solid stearin filling said chamber, said chamber being
 65 closed by said mirror whereby a difference of pressure may be maintained between said backing and the atmosphere to maintain the curvature of said mirror.

5. In a reflector, the combination of a curved mirror, a frame forming a chamber at the back of said mirror, and a solid backing filling said chamber, said chamber being closed
 75 by said mirror whereby a difference of pressure may be maintained between said backing and the atmosphere to maintain the curvature of said mirror, and a plunger entering
 80 said chamber and movable to vary the pressure therein.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

KNUT C. WIDEEN.

Witnesses:

DOMINGO A. USINA,
 GEORGE H. FRASER.